

Portland Ecoroof Tours



ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

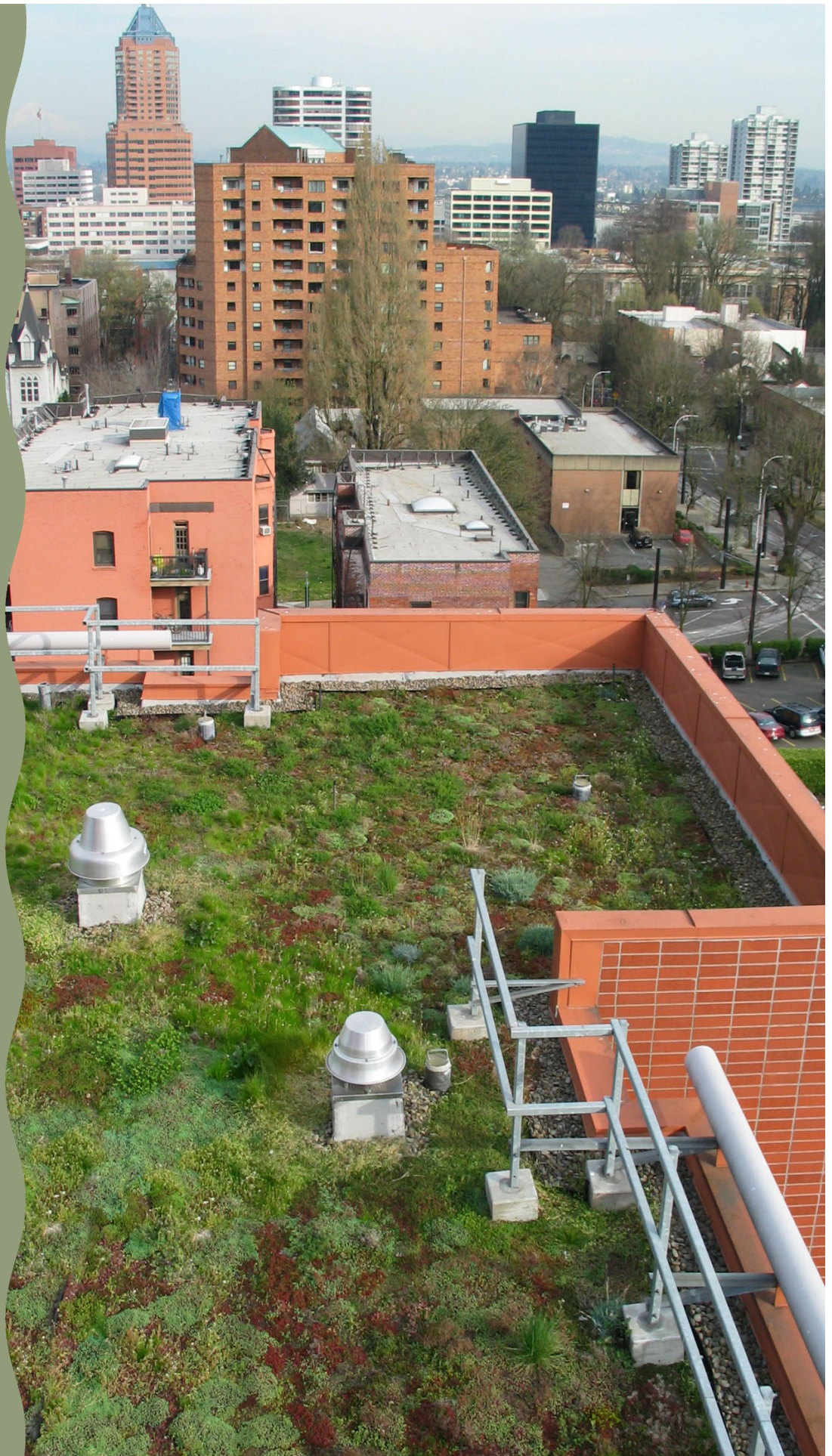






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* sites of interest without ecoroofs

A River Renaissance

The Willamette River is at the heart of Portland's economy, history, landscape and culture. Growth and prosperity have placed a heavy burden on Willamette Valley rivers and streams. These waterways face many critical challenges: pollution, sewer overflows, dying fish runs, erosion, and the loss of trees and wildlife habitat.

Greening Portland Rooftops

Ecoroofs are an important part of Portland's efforts to reduce the negative impact of stormwater runoff on rivers and streams. Environmental Services and the Office of Sustainable Development promote the use of ecoroofs, research ecoroof technology and give information and technical assistance to building owners who are considering installing an ecoroof.

Portland's Ecoroof Program

Research

Environmental Services monitors a downtown Portland ecoroof to gather data on how effective ecoroofs are in reducing stormwater runoff and improving water quality.

Education

Environmental Services staff provide technical assistance, tours, presentations and online resources for interested citizens and people installing ecoroofs.

Funding

City grants have funded ecoroofs on 14 sites ranging from high rise apartment complexes and office buildings to small park shelters and community based projects.

Policy

The City encourages ecoroof construction through building and zoning code. New development is required to treat all stormwater on site and an ecoroof is an approved treatment facility. Development in the central nine square miles of Portland is eligible for Floor Area Ratio bonuses for installing an ecoroof.

Future Financial Incentives

Environmental Services is developing a program to give stormwater fee discounts to properties for reducing impervious area.

Information included in this document was collected from project owners and their consultants. Environmental Services cannot guarantee its accuracy. Some information, i.e. maintenance, have not been included because of insufficient history.

Information source for Balfour-Guthrie (pg 5) and Stephen Epler Hall (pg 15): 2003 AIA Northwest & Pacific Region Conference. Architecture in an Environment of public Participation. Tour guide booklet.

A Brief History of Ecoroofs in Portland

1996

First ecoroof installed on a residential garage.

July 1999

The ecoroof is officially recognized as a stormwater management technique.

September 1999

Hamilton Apartments ecoroofs are completed with grant funding from Environmental Services. Monitoring on this roof begins in early 2001.

March 2001

Zoning code is amended to include ecoroofs as a floor area ratio bonus option.

Balfour-Guthrie - 733 SW Oak Street

Description: Historic Renovation into offices for the architect and the Oregon Energy Trust

Building Type and Construction: One of Portland's first cast-in-place concrete buildings

Completed: 2002

Gross Square Footage: 19,500

Cost of Building Construction: \$1.5 million

Project Team

Owner/Developer: Balfour Guthrie LLC

Architect/Designer: Thomas Hacker Architects, Inc.

Contractor: Gray Purcell

Sustainability Consultant: PGE Green Building Services

Mechanical Engineer: American Heating (Design Build)

Electrical Engineer: Northwest Electrical Specialties (Design Build)

Lighting Designer: Architectural Lighting Design

Other Consultants: Systems Commissioning Consultants

Incentives: State of Oregon, Business Energy Tax Credit; (BET/C) State of Oregon-Dept of Energy, Low Interest Loan Program; City of Portland - Office of Sustainable Development - G-Rated Program; State Historic Preservation Office, Property Tax Incentive Program; Federal Historic Tax Credit

Recognition: National Registry of Historic Places; LEED Silver Certification; ABC Merit Award 2002; Historic Restoration, Best Award 2002; Excellence in Green Building, Best Award 2002;

Green Building Feature Overview Process

- Integrated Design Approach: Integrated requirements for mechanical and electrical with visual impact of these components and the division of thermal zones throughout the office. Data and power cabling runs parallel with the duct work.
- Application of developed sustainable guidelines: LEED 2.0
- Application of incentive program criteria
- Energy modeling
- Commissioning

Systems

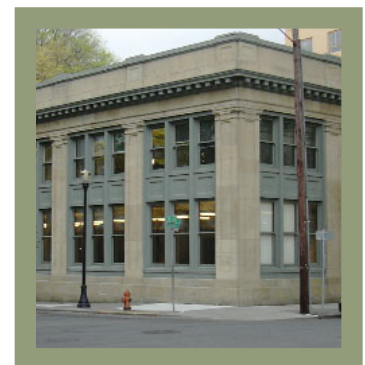
- Energy efficiency strategies:
 - ✓ Seven furnaces with four heat pumps and 11 zones, independently controlled
 - ✓ Daylight harvesting
 - ✓ Night sweeping, Energy Star rated roof and kitchen appliances,
 - ✓ Storm windows with low-e coating over historic double-hung sash windows,
 - ✓ Interior lighting: T-8 fluorescent lamps with electronic dimmable ballasts and zone attenuation,
 - ✓ ASKO brand dishwasher uses cold water only intake, heating water as needed for wash cycle,
 - ✓ Timer switches and occupancy sensors in all public rooms.
- Potable water use reduction/conservation: used low-flow toilets and all sinks have flow restrictors
- Bicycle parking with shower facilities

Materials

- Sustainable lumber: FSC certified wood used for more than 50% (cost) of the new installed wood. Reuse of existing wood base, moldings and wood panels.
- Non-toxic and low VOC materials: paint , adhesives, wheatboard cabinet substrate, formaldehyde free medium-density fiberboard for interior trim
- Recycled materials: Reuse of existing base board, moldings throughout.
- Rapidly Renewable Materials used on much of the flooring
- 75% of construction waste was salvaged

Other

- Minimized site impact: Used existing building
- Recycling amenities and practices
- Post occupancy evaluation: Staff has used less sick time since moving into the new offices.



Brewery Blocks - Block 4 - NW Couch Street - between 11th and 12th

Public Access: None

Introduction: Part of a five block, mixed use, redevelopment project of the former Blitz-Weinhardt brewing facility. Development incorporates green building practices and each of the projects is on track for LEED to LEED gold certification. Motivation for this ecoroof site was to provide improved views for neighboring buildings. Additional benefits include LEED credit points, an expected longer roof life, and additional building height from the City Floor Area Ratio bonus program. *Information originally published with Greenroofs for Healthy Cities.*

Project Team

Owner: Brewery Blocks Investors, LLC

Developer: Gerding Edlen Development

Architect: GBD Architects, Inc.

General Contractor: Hoffman Construction

Roofing Contractor: Snyder Roofing

Engineers: KPFF

Landscape Architect: Perron Collaborative

Landscape Contractor: Island Landscape

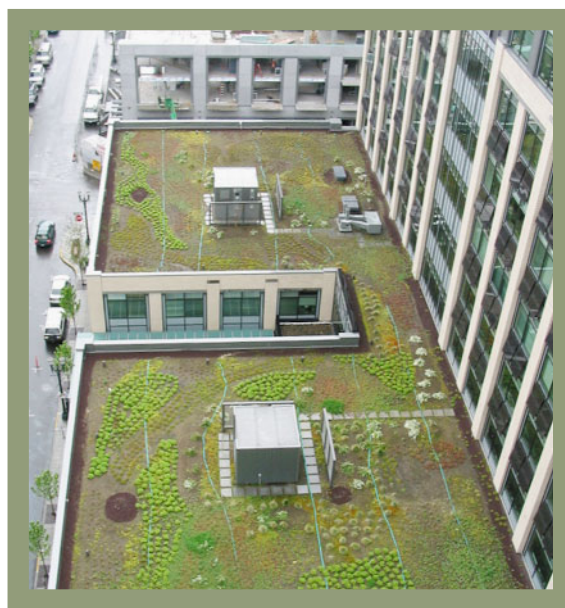
Type of Building: Ten story retail and office

Land Use: Mixed use commercial / office

Building Roof Area: 38,000 sq. ft., 3,530 sq. meters

Contacts: Kathy Bash, GBD Architects, 503-224-9656

Renee Worme, Gerding Edlen, 503-299-6000



Photograph-GBD Architects

Construction

Ecoroof Area: 14,000 sq. ft., 1,300 sq. meters

Type of Construction: New

Ecoroof Construction Date: March 2003

Solar Exposure: South

Slope: Flat

Funding: Private and OSD Green Investment Fund

Ecoroof Cost: \$9.50 / sq. ft. - estimated

Overflow: Roof drains to city storm system

Roof Structure: Concrete slab

Waterproof Membrane: Fabric-reinforced rubberized asphalt

Ecoroof Assembly: Asphalt protection layer, polyethylene root barrier, filter fabric over rigid insulation for drainage layer

Soil Mix: Swanson Bark Products blended mix.

Soil Depth: 5" (2" min), 13 cm (5 cm min)

Saturated Soil Weight: 18.75 psf max., 91.5 kg/sq. meter

Soil Stabilization: unavailable

Plant Material: Seven varieties of sedum, creeping ground covers, wildflowers and fescue.

Irrigation: Manually during the summer as needed

Ecotrust Building/Jean Vollum Natural Capital Center - 721 NW Ninth Avenue

Public Access: During business hours by outside stairwell

Introduction: The Jean Vollum Natural Capital Center received a LEED Gold certification for a remodel of a 1895 warehouse. It was the first project in Oregon, and the first historic renovation, to receive this level of certification. Building tenants include the City of Portland's Office of Sustainable Development, Ecotrust, Patagonia, Salmon Nation, Hotlips Pizza, and other environmentally conscious organizations. The design used materials with recycled content, water efficient landscaping and natural lighting. Stormwater is managed on site with the ecoroof, porous paving and parking lot swales.

Project Team

Owner: Ecotrust

Architect: HOLST Architecture

Developer: Heritage Consulting

Contractor: Walsh Construction

Roofer: McDonald and Welte

Landscape Design: Green Seasons Landscaping

Type of Building: Three story office and commercial

Land Use: Mixed use commercial/retail

Building Roof Area: ~20,000 sq. ft., ~1,860 sq. meters

Contact: Anthony Roy, Office of Sustainable Development, 503-823-7616

Construction

Ecoroof Area: 6,500 sq. ft., 604 sq. meters

Type of Construction: Remodel

Ecoroof Construction Date: September 2001

Solar Exposure: North, South, East, and West

Slope: 2%

Funding: Environmental Services Grant

Ecoroof Cost: unavailable

Overflow: Downspouts drain to parking lot bioswales

Roof Structure: unavailable

Waterproof Membrane: Pika Ply GR-4

Ecoroof Assembly: 8.2 mm thick Famos System, two layers of modified bitumen

Soil Mix: 30% sandy loam, 15% compost, 40% coarse perlite, 15% coconut coir. Pumice added

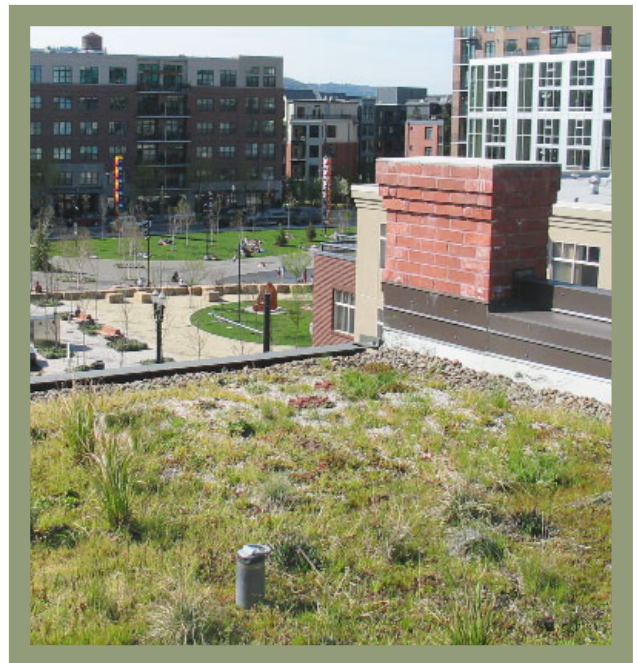
Soil Depth: 2", 5 cm

Saturated Soil Weight: 12 - 14 psf, 59 - 68 kg/sq. meter

Soil Stabilization: None

Plant Material: Planted with seven varieties of grass, eight varieties of sedum, and a wildflower mix. Due to poor performance the roof was interplanted with wetland prairie species.

Irrigation: Manually watered during the summer.



Broadway Building - 625 SW Jackson Street

Public Access: None

Introduction: Broadway Housing's ecoroof is the largest in Portland. It is located on a newly constructed 'gateway' building to downtown Portland, and is visible from the surrounding hills. The building provides students at Portland State University with retail on the ground floor, classrooms on the 2nd floor, and 8 floors of student housing. Portland State University students will monitor the ecoroof's performance.

Project Team

Owner: Portland State University / Urban Housing, LLC

Developer: Gerding Edlen

Architect: Otak Architects, Inc.

Contractor: Hoffman Construction

Landscape Contractor: Tuefel

Type of Building: 10 story mixed-use building

Land Use: University District

Building Roof Area: 22,849 sq. ft., 2,123 sq. meters

Contacts: Michele Crim, PSU Sustainability Coordinator,
503-725-8945, crimm@pdx.edu

Patrick Wilde, Gerding Edlen, 503-802-6609

Construction

Ecoroof Area: 15,239 sq. ft., 1,416 sq. meters

Type of Construction: New

Ecoroof Construction Date: June 2004

Solar Exposure: Predominately South

Slope: 2% min.

Funding: Public/Private, Bond

Ecoroof Cost: Approx. \$21 / sq. ft.

Overflow: City storm system

Roof Structure: Post tension concrete

Waterproof Membrane: Garlands stress-Ply polymer

Ecoroof Assembly: Green roof surfacing by Garland Company

Soil Mix: Blended soil from Swanson Bark Products

Soil Depth: 6", 15 cm

Saturated Soil Weight: 22.5 psf max, 110 kg/sq. meter

Soil Stabilization: unknown

Plant Material: Eleven species of sedum, sempervivum, ice plant and various wildflowers.

Irrigation: Installed automatic irrigation system to be used for the first two years



Rendering by Otak Architects, Inc.

Hamilton West Apartments - 1212 SW Clay Street

Public Access: By appointment

Introduction: This ecoroof was constructed as a partnership between Environmental Services, the Portland Development Commission, and the Housing Authority of Portland on a new high rise affordable housing project. This roof provides a demonstration and testing facility in Portland. The roof has two sides with different soil depths, 3" east and 5" west. Identical planting plans were used for both sides. Extensive water quality and flow monitoring have been done to determine the effectiveness of this roof. Data shows the western roof absorbing an average 53.5% of rainfall over a 27 month period, with 100% retention for warm weather storms.

Project Team

Owner: Housing Authority of Portland

Ecoroof Design: Garland Co. Inc.

Architect/Engineer: Otak Architects, Inc.

Contractor: Walsh Construction Co.

Landscape Contractor: Unavailable

Type of Building: 10 story apartment

Land Use: Multi-family Residential

Building Roof Area: 8,700 sq. ft., 808 sq. meters

Contact: Emily Hauth, Environmental Services,
503-823-7378



Construction

Ecoroof Area: 2,520 (east) 2,620 (west) sq. ft., 234 (east) 243 (west) sq. meters

Ecoroof Construction Date: September 1999

Solar Exposure: East, South and West

Slope: Flat

Funding: Housing Authority of Portland, Portland Development Commission, and Environmental Services grant

Ecoroof Cost: \$10.50 / sq. ft. including membrane

Permitting: Permitted with building

Overflow: Central roof drains to the City storm system.

Maintenance: The grass is trimmed and the roof weeded once a year.

Roof Structure: Concrete

Waterproof Membrane: Garland's StressPly Plus Polymer

Ecoroof Assembly: Garland drainage and root barrier.

Soil Mix: Garland specified from Pro-Gro

Soil Depth: 3" (east) 5" (west), 8 (east) 13 (west) cm

Saturated Soil Weight: 10 psf (east) 25 psf (west), 49 (east) 122 (west) kg/sq. meter

Soil Stabilization: None

Plant Material: A mix of sedum, delosperma, sempervivum, native and non-native wildflowers and grasses. Colonized by various grasses and weeds.

Irrigation: Irrigated during the summer with an installed spray head system.

Mosaic Condominiums - 1400 SW 11th Avenue

Public Access: None

Introduction: The Mosaic is a mixed-use condominium building located along the Streetcar line in the heart of Portland's cultural district near theater and museums. It is an example of dense, urban infill development. The Mosaic was one of the first buildings to take advantage of the floor area ratio (FAR) bonus provided by the City for installing an ecoroof. This additional FAR allowed for the construction of six additional units.

Project Team

Owner: Mosaic Properties

Architect: Myhre Group Architects

Ecoroof Design: Lango Hansen Landscape Architects

Landscape Contractor: Green Season's Landscaping

Type of Building: Eight story residential with live/work units on ground floor

Land Use: Central Residential - multi-family / mixed use

Building Roof Area: 3,938 and 732 sq. ft., 366 and 68 sq.meters

Contact: Trevor Kitchen, Excelsior Property Management, 503-699-5427

Construction

Ecoroof Area: 3,060 and 313 sq. ft., 284 and 29 sq. meters

Ecoroof Construction Date: September 2003

Solar Exposure: North, East, South and West

Slope: Flat

Funding: Private, FAR bonus as an incentive

Ecoroof Cost: Unavailable

Overflow: City storm system

Roof Structure: Concrete

Waterproof Membrane: Carsile

Ecoroof Assembly: Carsile system

Soil Mix: Pro-Gro mix

Soil Depth: 4", 10 cm

Saturated Soil Weight: unknown

Soil Stabilization: Unavailable

Plant Material: Sedum

Irrigation: none - quick couplers



Museum Place Lofts and Townhouses - 1030 SW Jefferson Street

Public Access: None

Introduction: The Museum Place Lofts and Townhouses rooftop garden provides a community park that serves the residents of this new urban development. The project team worked with Portland General Electric, the City of Portland's Office of Sustainable Development and Portland Development Commission to achieve both PGE's Earth Advantage and LEED (in progress) certification. Other green building features include maximized views; 40% more efficient water consumption; a refrigeration heat recovery system in the Safeway store; and Energy Star roofing material.

Project Team

Owner: Sockeye Museum Place South, LLC

Project Manager: Shiels Oblatz Johnsen, Inc.

Architect: GBD Architects, Incorporated

General Contractor: Howard S. Wright Construction Co.

Landscape Architect: Walker Macy

Structural Engineer: KPFF Consulting Engineers

Type of Building: Seven story Mixed Commercial/Residential

Land Use: High Density Multi-Dwelling Zone

Building Roof Area: 40,000 sq. ft., 3,720 sq. meters

Contact: Lisa Selman, Shiels Oblatz Johnsen, Inc., 503-242-0084
Mauricio Villarreal, Walker Macy, 503-228-3122

Construction

Roof Garden Area: 11,000 sq. ft. (with hardscape), 1,020 sq. meters

Type of Construction: New

Roof Garden Construction Date: September 2003

Solar Exposure: South, w/a.m. and p.m. shade

Slope: unavailable

Funding: Fannie Mae, U.S. Bank, Portland Development Commission, Green Park, Financial, BLO Grantor Trust, Portland Office of Sustainable Development Green Investment Fund Grant

Roof Garden Cost: unavailable

Overflow: City storm system

Roof Structure: Level pavers on pedestals with sloped structural slab below

Waterproof Membrane: unavailable

Roof Garden Assembly: unavailable

Soil Mix: Light Weight Soil Mix (40% sandy loam, 10% compost, 30% coarse perlite, 20% coir), Mycorrhizal Soil Inoculum, Fertilizer

Soil Depth: 9" to 30", 23 to 76 cm

Saturated Soil Weight: unavailable

Soil Stabilization: none

Plant Material: Grass, ornamental shrubs, vines and perennials

Irrigation: All year, automatically controlled underground irrigation system



Photograph-Walker Macy Landscape Architects

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	BEAVERTON
22	Clean Water Services* (not on map)

* publicly Accessible - see sheet for details





Native American Student and Community Center - PSU - 710 SW Jackson Street

Public Access: During business hours

Introduction: This roof garden is a public green space that also mitigates water runoff. Other sustainable features include the use of daylighting, and an active/passive ventilation system, in lieu of air conditioning, that tells building occupants when to open the windows and turn off the fan system. The nature of the building and its adoption by the Native American community ensures that the roof garden area will be cared for as a relatively high-maintenance garden featuring plants important to Native American culture, rather than as a prototypical low-maintenance ecoroof.

Project Team

Owner: Portland State University

Architect: StastnyBrun Architects

Landscape Architect: McCormack Landscape Designs

Structural Engineer: KPFF

General Contractor: Andersen Construction Co. Inc.

Type of Building: One story steel, masonry and concrete

Land Use: University District

Building Roof Area: 11,000 sq. ft., 1,020 sq. meters

Contact: Tabitha Whitefoot, Director, Native American Student and Community Center, 503-725-9695

Construction

Roof Garden Area: 4,000 sq. ft., 370 sq. meters

Type of Construction: New

Roof Garden Construction Date: August 2003

Solar Exposure: South

Slope: unknown

Funding: State of Oregon, gifts, grants: Federal EDA Office of Sustainable Development and PSU Facilities, Sustainability section

Roof Garden Cost: Not calculated independently.

Overflow: Through cartridge filters before entering city system

Roof Structure: Upgraded to steel and concrete construction for assembly occupancy and to hold deep soil depths

Waterproof Membrane: APAO Modified Bituminous Sheet

Roof Garden Assembly: Ameridrain 560 drain mat. Washed drainage rock in primary runoff areas to prevent erosion. Drain rock separated from soil and top dressing with geotextile fabric.

Soil Mix: Soilless planting mix with nutrient charge

Soil Depth: 6" to 30", 15 to 76 cm

Saturated Soil Weight: 200 psf max, 977 kg/sq. meter

Soil Stabilization: Bark mulch top dressing

Plant Material: Native evergreen and deciduous shrubs, grasses, sedum, bulbs and perennials.

Irrigation: Installed automated system



Stephen E. Epler Hall - PSU, 1824 SW 12th

Description: 130 college residential units over classrooms and offices on the ground floor

Building Type and Construction: wood frame construction over concrete ground floor

Completed: 2003

Gross Square Footage: 64,040

Cost of Building Construction: \$7.6 million

Project Team

Owner: Portland State University

Architect: Mithun Architects+Designers+Planners

Contractor: Walsh Construction

Civil Engineer: kpff Consulting Engineers

Mechanical/Electrical Engineer: Interface Engineering

Energy Consultant: Interface Engineering

Lighting Design Consultant: Seattle Lighting Lab

Interior Design: Mithun Architects+Designers+Planners

Landscape Architect: Atlas Landscape Architecture

Incentives: City of Portland Office of Sustainability; Portland's Environmental Services negotiated System Development Fee credit

Recognition: LEED Silver Certification pending

Green Building Feature Overview

Process

- Environmental charrette
- Public participation and review with students
- Application of developed sustainable guidelines; LEED, City of Portland Central City Guidelines
- Energy and daylighting modeling
- Commissioning

Systems

- Energy efficient heating and ventilation equipment; gas fired boilers for hot water and radiant first floor, heat recovery units and mechanically assisted natural ventilation, no mechanical air cooling
- Energy efficiency strategies achieving 30% over Oregon Energy Code
- Reduction of heat island effect with white roofing
- Rainwater harvested for landscaping and first floor toilets

- Stormwater management with bioswales to treat water before release to storm sewer
- Potable water use reduction/conservation with low flow fixtures
- Transportation; ready access to public mass transit including bus and trolley

Materials

- Engineered wood materials urea-formaldehyde free
- Sustainable lumber; recycled lumber flooring in lobby and rapidly renewable cabinet cores
- Non-toxic and low VOC materials
- Locally harvested or assembled materials 81% of construction costs not including MEP
- Minimization of interior finish materials
- Construction waste reduction; 90% diversion from waste stream

Other

- High efficiency electrical motors at 99%
- Recycling amenities and tenant training
- Occupant comfort and well being, natural ventilation and designation as a smoke-free building through leasing arrangement



B & O Building - Lando Test Plots - 107 SE Washington Street

Public Access: During business hours and by appointment

Introduction: Local firm Lando and Associates, Landscape Architecture installed eight ecoroof test plots, totaling 4,000 sq. ft., to investigate critical technologies that can be applied to large commercial buildings (warehouse, big box retailer, etc.) with minimal additional costs. The project design addresses structural loading, propagation methodology, plant material, irrigation regime and maintenance costs. Each attribute is designed according to a “bare essentials” approach to demonstrate the effectiveness of a lightweight vegetative roof and its capabilities as a simple, cost-effective solution for stormwater management. The planted testing area maintains a constant plant composition, installation method and field-saturated rate of 10 pounds/sq. ft. over the entire testing facility.

Project Team

Landscape Architect: Lando and Associates

Engineers: Miller Engineering, Pro-Grow Horticultural Services, Hobbs and Hopkins - ProTime, CSI Geosynthetics

Type of Building: Warehouse

Land Use: Industrial

Building Roof Area: 39,000 sq. ft., 3,620 sq. meters

Contact: Pat Lando, Lando and Associates, Landscape Architecture, 503-233-6600

Construction

Ecoroof Area: 4,000 sq. ft., 360 sq. meters

Ecoroof Construction Date: February 2003

Type of Construction: Retrofit (temporary)

Solar Exposure: South, East, and West

Slope: flat / toward north

Funding: Lando and Associates, Landscape Architects, US Fish and Wildlife, Metro Greenspaces grant

Ecoroof Cost: unavailable

Overflow: Existing building roof to city storm system

Roof Structure: Wood framing. 4" wood deck.

Waterproof Membrane: EPDM (for test plot containment only)

Ecoroof Assembly: Lando tests

Soil Mix: Varies by plot

Soil Depth: Varies by plot

Saturated Soil Weight: 10 psf max, 49 kg/sq. meter

Soil Stabilization: Straw blanket, rye cover crop.

Plant Material: Broadcast plant cuttings (sedum) followed by annual rye seed.

Irrigation: Irrigated as needed.



Photograph-Lando and Associates

Buckman Terrace Apartments - 303 NE 16th at Sandy Blvd.

Public Access: None

Introduction: The two ecoroofs at this apartment complex are part of a larger stormwater management design for the entire site. The roof located over the entrance on 16th is 200 sq. ft. and treats an additional 25 sq. ft. of roof area. The roof on the corner at 16th and Sandy is 1,500 sq. ft. and treats an additional 750 sq. ft. of roof area. The raised beds along the front of the building serve as rainwater planters. The sidewalk along 16th Avenue is curved to protect established trees. Downspouts on the west side of the building drain to swales. The parking lot at Buckman Heights (across the street) drains to swales and the courtyard drains to a raingarden.

Project Team

Owner: Prendergast Development

Project Manager: Ed McNamara

Type of Building: Apartment

Land Use: Central Employment zone - mixed use

Building Roof Area: 25,000 sq. ft., 2,323 sq. meters

Contact: Emily Hauth, Environmental Services
503-823-7378

Construction

Ecoroof Area: 1,500 and 200 sq. ft., 139 and 19 sq. meters

Ecoroof Construction Date: Spring 2000

Type of Construction: New

Solar Exposure: East, South, and West

Slope: flat

Funding: Property owner and Environmental Services grant.

Ecoroof Cost: \$12 / sq. ft. including membrane

Overflow: To swale and planters

Roof Structure: Wood frame with a plywood deck.

Waterproof Membrane: American Hydrotech Bitumen

Ecoroof Assembly: American Hydrotech system: drainage cups, filter fabric and root barrier

Soil Mix: unknown

Soil Depth: 4", 10 cm

Saturated Soil Weight: 20 psf, 98 kg/sq. meter

Soil Stabilization: n/a

Plant Material: Native grasses, ferns and sedum. Added sedum plugs

Irrigation: Manually watered by soakage hoses every two weeks in the summer.



Hawthorne Condominiums - 3430 SE Hawthorne Blvd. - over garages

Public Access: none

Introduction: The Hawthorne Condominiums ecoroof stemmed from neighborhood requests for incorporating green elements in the development, as well as the owner's desire to provide a visual "front yard" to the residents and to reduce summer heat and glare. The developer enlisted the services of Ecoroofs Everywhere, a local non-profit, to provide reduced-rate technical design services, project management, and construction, cutting overall ecoroof costs by 20 percent. Over 40 volunteers built the ecoroof in one weekend, including hauling 30 yards of soil to the rooftop by hand. The roof contains accessible herb areas for use by residents, provides a good model for low cost green space in tight urban spaces, and manages stormwater efficiently.

Project Team

Architect: Vallaster & Corl

Ecoroof Design: Jason King, ASLA

Ecoroof Construction/Project Coordination: Ecoroofs Everywhere

Type of Building: 3 story mixed residential / commercial

Land Use: Storefront Commercial

Building Roof Area: 1,480 sq. ft. (garages), 137 sq. meters

Contact: Jason King - ASLA, Macdonald Environmental Planning, 503-224-1225

Construction

Ecoroof Area: 1,480 sq. ft., 137 sq. meters

Ecoroof Construction Date: March 2004

Type of Construction: New

Solar Exposure: South

Slope: Less than 1%

Funding: Private funding; Ecoroofs Everywhere provided reduced-rate design and project management services

Ecoroof Cost: \$8/sq. ft. (ecoroof assembly w/o roof cost)

Overflow: Stored in a stormwater detention pipe before entering city system

Roof Structure: The 4" concrete slab on steel decking roof was engineered to hold additional weight

Waterproof Membrane: Torch down PVC membrane

Ecoroof Assembly: Drain Material: TremCo GR w/ copper hydroxide root barrier

Edging: custom prefabricated perforated aluminum around roof drains

Soil Mix: Pro-Gro aggregate 1-1 (perlite, pumice, paper pulp and digested fiber)

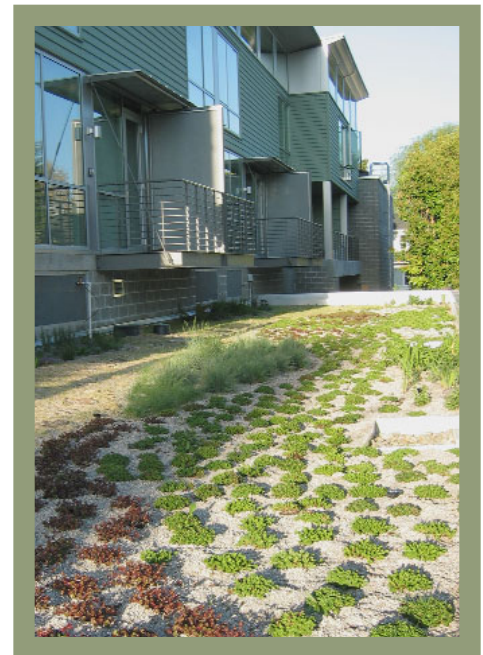
Soil Depth: 6", 15 cm

Saturated Soil Weight: 28 psf, 137 kg/sq. meters

Soil Stabilization: Hobbs & Hopkins Straw Mulch

Plant Material: Sixteen varieties of sedum, perennials, herbs, blue fescue, and wildflowers.

Irrigation: Above ground spray irrigation system w/automatic controller



Hawthorne Hostel - 3031 SE Hawthorne Blvd.

Public Access: Visible from street and by appointment

Introduction: The Hawthorne Hostel Ecoroof is the most visible ecoroof in the Portland area. Educational signage along the sidewalk provides a strong connection between the pedestrian environment and the roof, and makes this site ideal for outreach and education regarding combined sewer overflows (CSOs), stormwater, and green building. A group of community members undertook all the challenges of retrofitting the porch roof of a 95 year old Victorian house to install an ecoroof. The ecoroof helps cool the hostel in the summer and provides food and nesting materials for birds, bees and other pollinators. Additional information is available online at: www.ecoroofseverywhere.org and www.portlandhostel.org/ecoroof/.

Project Team

Design Build: Greg Haines, Ecoroofs Everywhere

Technical Assistance: Pat Lando, Lando and Associates
Landscape Architecture

Type of Building: Residential house

Land Use: Hotel/Motel

Building Roof Area: ~1,500 sq. ft., ~140 sq. meters

Contacts: Ecoroofs Everywhere

Greg Haines, Hawthorne Hostel, 503-740-2051

Anthony Roy, 503-823-7616

Construction

Ecoroof Area: 650 sq. ft., 60 sq. meters

Ecoroof Construction Date: August 2002

Type of Construction: Retrofit

Solar Exposure: South

Slope: 25%

Funding: \$5,000 Environmental Services, Community Watershed Stewardship Program grant

Ecoroof Cost: \$7.70/sq. ft.

Overflow: Perforated piping, gutter to rainbarrel

Roof Structure: Most of the grant funding paid for restructuring the porch and roof of this old house.

Waterproof Membrane: EPDM (synthetic rubber liner)

Ecoroof Assembly: Plywood Decking.

Soil Mix: 2" Pro-Gro mix: native soil, compost and pumice. Topdressed with 1" of pumice, digested fiber and paper pulp.

Soil Depth: 3", 7-6 cm

Saturated Soil Weight: 20 psf, 981 kg/sq. meter

Soil Stabilization: Jute

Plant Material: Sedum, semperivivum, and yarrow

Irrigation: Manually irrigated during the summer.



Multnomah County Building - 501 SE Hawthorne Blvd.

Public Access: During business hours

Introduction: At the time of installation, this green roof was the largest in the City of Portland. It is a retrofit green roof located on the 5th floor of the Multnomah County Building and is accessible to the public during business hours. Interpretive displays are included on the 3,000 sq. ft. outdoor patio area and provide information about the installation, composition and benefits of this green roof. Portland State University will monitor stormwater reductions and energy savings.

Project Team

Lead Architect: Carleton Hart Architecture

Landscape Architect: Macdonald Environmental Planning

Mechanical/Electrical Engineers: Interface Engineering

Structural Engineers: KPFF Consulting Engineers

Green Roof Consultant: Mary-Anne Boivin

Type of Building: Six story government office building

Land Use: Commercial / Industrial

Building Roof Area: 15,420 sq. ft., 1,433 sq. meters

Contact: Jason King - ASLA, Macdonald Environmental Planning, 503-224-1225, jking@mep-pc.com

Amy Joslin, Sustainability Mgr., Multnomah County, 503-988-4092, amy.m.joslin@co.multnomah.or.us



Construction

Ecoroof Area: 11,893 sq. ft., 1,105 sq. meters

Ecoroof Construction Date: July 2003

Type of Construction: Retrofit

Solar Exposure: Western

Slope: Undulating soil on flat roof

Funding: \$216,000 - Multnomah County; \$50,000 - Environmental Services Stormwater; \$75,600 - DEQ; Seed mix from Turf Seed; Protection board donated by Tremco

Ecoroof Cost: \$17 /sq. ft. - construction cost (excludes membrane)

Overflow: City storm sewer

Roof Structure: No structural adjustments needed. Weight allowance was approx 30 psf

Waterproof Membrane: Existing 5 ply built up roof

Ecoroof Assembly: TremCo GR drainage layer with a Copper Hydroxide root barrier

Soil Mix: Pro-Gro Aggregate 1-1 with pumice, perlite, organic matter and paper pulp

Soil Depth: 6", 15 cm

Saturated Soil Weight: 28 psf - entire system, 137 kg/sq. meter

Soil Stabilization: Pro-Time straw mulch

Plant Material: A mix of sedum, fescue, wildflowers, perennials and ornamental grasses.

Irrigation: Buried drip system.

People's Food Co-op - 3029 SE 21st Avenue

Public Access: Visible from the street and from inside during business hours

Introduction: People's Food Co-op is a member owned food cooperative in operation since 1970. Members have always maintained a commitment to sustainable products and incorporated many green design elements into their recent expansion. These include a ground source heat pump heating/cooling system, and the use of recycled, toxic free and durable construction materials. There are two ecoroofs on site, a sloped roof on the south side and a flat roof over the entrance. See www.ecoroofofseverywhere.org and www.peoples.coop for more information.

Project Team

Owner: People's Food Co-op

Design and Project Management: Ecoroofs Everywhere

Technical Assistance: Jason King, ASLA

Landscape: Steve Nelson

Flat roof details: Dave Wadley

Type of Building: 2 story retail store in converted home

Land Use: Retail in residential neighborhood

Building Roof Area: unknown

Contact: Anthony Roy, Ecoroofs Everywhere, 503-823-7616

People's Food Co-op, 503-234-0816

Construction

Ecoroof Area: 140 (sloped) and 70 (flat) sq. ft., 13 (sloped) and 6.5 (flat) sq. meters

Ecoroof Construction Date: March 2003

Type of Construction: Remodel

Solar Exposure: East and South

Slope: 16.6 and 5.5 degrees

Funding: \$2,500 Environmental Services Community Watershed Stewardship Program Grant. Ecoroofs Everywhere provided grant writing, design, and project management with volunteer coordination.

Ecoroof Cost: \$12 / sq. ft.

Overflow: 1,500 gallon cistern to toilets and irrigation.

Roof Structure: Unavailable

Waterproof Membrane: EPDM (also root barrier)

Ecoroof Assembly: Existing bitumen roof. Protective visqueen layer under EPDM.

Soil Mix: Both: ~50% pumice and vermiculite. Sloped: organic matter and sand. **Flat roof:** rotted cow manure

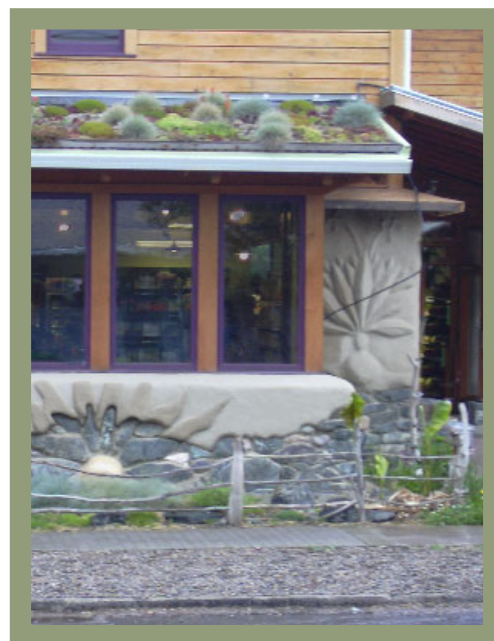
Soil Depth: 3" (sloped), 6" (flat), 8 (sloped), 15 (flat) cm

Saturated Soil Weight: ~45 psf (sloped), ~220 kg/sq. meter (sloped)

Soil Stabilization: Jute blanket

Plant Material: Over 70 species of sedum and sempervivum, fescue and wildflowers. Including White Larkspur (*Delphinium leucophaeum*) an endangered native species.

Irrigation: Manually irrigated as needed.



Clean Water Services: Field Operations Facility - 2025 SW Merlo Court, Beaverton

Public Access: M - F: 7am to 5pm

Introduction: Clean Water Services is the stormwater and sanitary sewer agency for urban Washington County, Oregon. One of the goals for their new field operations yard was to create a demonstration facility for innovative erosion control and water quality treatment. Construction runoff was minimized and treated by covering the site with gravel, installing treatment swales and a sediment filter dam. Permanent facilities include an ecoroof, scupper gardens to treat roof runoff, a porous concrete parking lot, a green street with vegetated swales replacing curbs and gutters, vegetated swales instead of catch basins and storm pipes, and a 50' by 600' water quality swale along the rear.

Project Team

Owner: Clean Water Services

Architect: WBGs, Eugene, OR

Contractor: Baugh-Skanska

Construction Manager and Project Partner: TriMet

Type of Building: One story concrete block and steel

Land Use: Light Industrial

Building Roof Area: 46,000 sq. ft., 4,274 sq. meters

Contact: Chris Bowles, Field Operations Manager,
CWS, 503-547-8102

bowlesc@cleanwaterservices.org

Construction

Ecoroof Area: 8,000 sq. ft., 743 sq. meters

Ecoroof Construction Date: August 2003

Type of Construction: New

Solar Exposure: Northern

Slope: 16%

Funding: District revenue; no outside funding.

Ecoroof Cost: \$6 / sq. ft. for the base roof system

Overflow: Roof drains to drywells and then to vegetated swales.

Roof Structure: Steel joist and decking

Waterproof Membrane: 4 ply Soprema USA hot mop application

Ecoroof Assembly: Steel decking, drainage layer

Soil Mix: Potting soil

Soil Depth: 3" - 4", 8 - 10 cm

Saturated Soil Weight: Not measured

Soil Stabilization: Aluminum stabilization grid, and plastic geo-cells

Plant Material: A variety of sedum, wildflowers, and ground covers.

Irrigation: Temporary irrigation system with automatic timer in place



Photograph-Clean Water Services

Notes:





ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

Dan Saltzman, Commissioner
Dean Marriott, Director

For more information on
ecoroofs call 503-823-7740

visit our website
www.cleanriverspdx.org

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